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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,215	11/26/2003	Michael O. Polley	TI-36036	8507

23494 7590 08/20/2009
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EXAMINER	
GHULAMALI, QUTBUDDIN	

ART UNIT	PAPER NUMBER
2611	

NOTIFICATION DATE	DELIVERY MODE
08/20/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/723,215	Applicant(s) POLLEY ET AL.	
	Examiner Qutbuddin Ghulamali	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 May 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11,13-22,25 and 26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,13-22,25 and 26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to remarks/amendment filed 5/15/2009.

Response to Remarks/Amendment

2. Applicant's remarks/amendment, page 11, filed 5/19/2009 have been fully considered but they are not persuasive. The applicant remarks that Yun does not overcome the limitations of Raleigh, that is, power for individual sub-channels or even weighting vectors in a transmission context. The applicant further remarks, that the signal quality processor 513 and 533 are in the receiver part of the system, with reference to figs 5(a) and 5(b). The examiner agrees that figs. 5(a) and 5(b) represent a receiver. However, the applicant appears to misrepresent the Yun teachings and highlights only the receiver shown in Figs 5A and 5B. Yun, in fact clearly discloses both a transmitter and a receiver and therefore, the examiner disagrees that Yun discloses receiver and that Yun fails to disclose power for individual sub-channels or weighting as not transmitter related. Yun, page 3, section 0027, discloses determination of a complete transmit weight vector of weights for transmitting from the communication station to a particular remote user, the complete transmit weight vector comprising a set of relative transmit weights and a scaling to apply to the weights, into a relative transmit weight vector determining part and a separate transmit power adjustment part. In figs. 7(b) and 8(b) Yun discloses the downlink power control, weighting and communication quality determination, for downlink determination (in step 733), there is an index i for every downlink connection in the global system. The general formulation (of having

different c.sub.i values) (page 15, section 0129) allows one to specify which connections are more important than others. For example, a particular c.sub.i=0 means that on that spatial channel, no attempt to minimize the transmit power is made so that the highest quality is maintained. The applicant further remarks that the claims are drawn to a multiple antenna wireless device that communicates with a single antenna enabled device across a spectrum having a plurality of sub-channels. Examiner, as previously pointed, would like to draw applicant's attention once more to Raleigh wherein Raleigh discloses in col. 2, lines 1-15, that one wireless embodiment operates with an efficient combination of a substantially orthogonalizing procedure (SOP) in conjunction with a plurality of transmitter antenna elements with one receiver antenna element, or a plurality of receiver antenna elements with one transmit antenna element, or a plurality of both transmitter and receiver antenna elements. Raleigh, therefore satisfies limitation recited in the claim for a multiple antenna wireless device that may communicate with a single antenna device across a spectrum having a plurality of sub-channels (diversity communication modulation is well known in the art). Therefore, as highlighted above, Raleigh and Yun, disclosure provides teaching that substantially reads on limitations as claimed.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-7, 9-11, 13-22, 25, 26 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Raleigh et al (USP 6,144,711) in view of Yun (US Pub. 2007/0173277).

Regarding claims 1, 20, Raleigh discloses a multiple-antenna wireless device that communicates with a single antenna device (it is obvious that in order to communicate a device or multiple or set of devices has to be enabled in order to communicate) (col. 2, lines 1-15) across a spectrum having a plurality of sub-channels, comprising:

a plurality of antennas through the multiple-antenna wireless device communicates with a single antenna enabled device (a second wireless device), each antenna of the plurality of antennas communicates with the single antenna enabled device (second wireless device) via an associated communication pathway between a subset of the plurality of antennas on the multiple antenna wireless device and an antenna on single antenna device (Raleigh discloses that it may be preferable to transmit and receive only on a subset of the possible sub-channels) (col. 2, lines 1-15; col. 11, lines 42-67; col. 17, lines 40-53). Raleigh, however, does not explicitly disclose, sub-channel power analysis logic coupled to the plurality of antennas and adapted to determine a communication quality for at least two communication pathways and determine which communication pathway has a highest communication quality on a sub-channel by sub-channel basis; and

diversity selection logic coupled to the sub-channel power analysis logic and adapted to determine a weighting vector for an associated antenna based on the highest communication quality, wherein the weighting vector specifies a relative transmission power for each sub-channel for the associated antenna.

However, Yun in a similar field of endeavor discloses sub-channel power analysis logic coupled to the plurality of antennas and adapted to determine a communication quality for at least two communication pathways and determine which communication pathway has a highest communication quality (that is minimal transmitted power) on a sub-channel by sub-channel basis (page 3, section 0027; page 4, section 0028, 0029; page 8, section 0058, 0061; page 11, section 0107; page 15, section 0129; page 17, section 0140; page 19, section 0161);

diversity selection logic coupled to the sub-channel power analysis logic and adapted to determine an antenna chain (array) weighting vector for an associated antenna based on the highest communication quality, wherein antenna chain (array) weighting vector specifies a relative transmission power for each sub-channel for the associated antenna chain (array) (page 3, section 0027, lines 15-27; page 4, section 0028, lines 1-2, 14-29, section 0029, section 0030, lines 4-8, 63; page 9, section 0077). It would have been obvious to a person of ordinary skill in the art to use weighting vector specify transmission power for each sub-channel for an associated antenna as taught by Yun in the art of Raleigh because it can minimize the total radiated power while maintaining acceptable quality levels for all channels.

Regarding claim 2, Raleigh discloses representing the weighting vector using a plurality of bits, (the input data sequence is encoded into sequence of symbols of digitized values or bits) each bit corresponding to a different sub-channel, and each bit indicating whether an antenna associated with the weighting vector is used to transmit data on the corresponding sub-channel (col. 5, lines 35-67; col. 6, lines 42-67).

Regarding claim 3, Raleigh and Yun combined discloses all limitations of the claim except does not explicitly disclose weighting vector in a ratio format; and ratio format specifies an amount of power to be applied to an antenna associated with the weighting vector for each sub-channel. The examiner takes the position that values or vector weights can be represented in as a ratio and is well known in the art. As per an amount of power to be applied to an antenna associated with the weighting vector for each sub-channel, Yun however, discloses an amount of power to be applied to an antenna associated with the weighting vector for each sub-channel (page 3, section 0027, lines 15-27; page 4, lines 1-2, section 0028, lines 14-29, section 0029, lines 4-8, 63, section 0030). It would have been obvious to a person of ordinary skill in the art to use weighting vector specify transmission power for each sub-channel for an associated antenna as taught by Yun in the art of Raleigh because it can minimize the total radiated power while maintaining acceptable quality levels for all channels.

Regarding claim 7, Raleigh discloses wireless device wirelessly communicate with a plurality of wireless stations (see fig. 6).

Regarding claims 13, 20, Raleigh discloses a method comprising:

receiving data from a first wireless devices to a second wireless devices using a plurality of antennas (fig. 4-5, elements 55) a plurality of antennas through which the wireless device communicates with a second wireless device, each antenna of the plurality of antennas communicates with the second wireless device via an associated communication pathway (155a-f) (col. 2, lines 1-15; col. 11, lines 42-67);

determining a plurality of channel characteristics (radiation pattern such as cross talk or signal to noise ratio associated with channel communication is well studied in the art of spatial communication) associated with each antenna of the plurality of antennas (col. 17, lines 30-53);

on a per sub-channel basis, computing a weighting vector for each antenna of the plurality of antennas based on the plurality of channel characteristics (col. 8, lines 1-9, 40-53; col. 17, lines 30-53);.

for each communication pathway, combining a transmission signal with the weighting vector to form a weighted transmission signal (col. 6, lines 42-40; col. 8, lines 40-48); and

transmitting the weighted transmission signal from the second wireless device to the first wireless (from one device to another) device via a plurality of communication pathways (col. 6, lines 42-50; col. 7, lines 35-39). Raleigh does not explicitly disclose weighting vector in a ratio format; and ratio format specifies an amount of power to be applied to an antenna associated with the weighting vector for each sub-channel. The examiner takes the position that values or vector weights can be represented in as a ratio and is well known in the art. As per an amount of power to be applied to an

antenna associated with the weighting vector for each sub-channel, Yun, however, discloses an amount of power to be applied to an antenna associated with the weighting vector for each sub-channel (page 3, section 0027; page 14, section 0126). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to specify an amount of power to be applied to an antenna associated with weight vectors as taught by Yun in the system of Raleigh because with the use of amount of power to be applied in a ration form can optimize quality of the received signal and antenna signal selection of power and quality.

Regarding claim 14, Raleigh discloses all limitations of the claim above, except does not explicitly disclose the amount of power to be applied to an antenna is based on the communication quality of each sub-channel. However, Yun discloses the amount of power to be applied to an antenna is based on the communication quality of each sub-channel (page 4, section 0028). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to specify an amount of power to be applied to an antenna associated with weight vectors as taught by Yun in the system of Raleigh because with the use of amount of power to be applied in a ration form can optimize quality of the received signal and antenna signal selection of power and quality because.

As to claim 17, Raleigh discloses various sub-channels are characterized by the signal-to-noise ratio (col. 17, lines 40-53; col. 18, lines 8-25).

Regarding claim 18, Raleigh discloses a system comprising:

an access point (a node or a connection for receiving and transmitting signals such as an antenna) having a plurality of antennas (fig. 6, element 55);

a wireless station in communication with the access point via a single antenna in the wireless station (col. 2, lines 1-15), wherein the plurality of antennas in the access point receive a data signal from the single antenna in the wireless station via a plurality of communication pathways (col. 7, lines 35-40), each communication pathway comprising a plurality of sub-channels. Raleigh, however, does not explicitly disclose wherein the access point determines channel characteristics and a weighting vector for each antenna of the plurality of antennas; wherein the access point reproduces a data transmission signals with a different weighting vector to produce weighted transmission signals and transmits each weighted signal via separate paths. However Yun discloses determines channel characteristics and a weighting vector indicative of power for each antenna of the plurality of antennas; wherein the access point reproduces a data transmission signals with a different weighting vector to produce weighted transmission signals and transmits each weighted signal via separate paths (page 3, section 0027, lines 15-27; page 4, lines 1-2, section 0028, lines 14-29, section 0029, lines 4-8, 63, section 0030). It would have been obvious to a person of ordinary skill in the art to use weighting vector specify transmission power for each sub-channel for an associated antenna as taught by Yun in the art of Raleigh because it can minimize the total power.

Regarding claim 19, the Industry Standard, such as IEEE 802.11a, b, g describes protocols for use in OFDM and in DSSS wherein communication between two devices is enabled by splitting into several parts or sub channels each byte of data to be

transmitted for transmission concurrently or simultaneously on different frequencies over sub-channels of a wide frequency spectrum, is well known in the art of communication (col. 5, lines 35-67; col. 6, lines 42-67).

Regarding claims 21-22, Raleigh and Yun discloses all limitations of the claim above. The combination further discloses amount of power to be provided to antennas for various sub-channels are characterized by the signal-to-noise ratio for that antenna (page 4, section 0028). It would have been obvious to a person of ordinary skill in the art at the time the invention was made that Raleigh in view of Yun satisfy the limitation of the claims.

Regarding claim 25, 26, 4, 5, 6, 15, Raleigh discloses a method comprising: for each of a plurality of antennas, determining communication quality of each sub-channel of a communication pathway, the communication pathway comprising a plurality of sub-channels (a "sub-channel" is a combination of a bin in a substantially orthogonalizing procedure (SOP)) (col. 1, lines 31-59; col. 2, lines 1-15);
for each sub-channel, selecting at least one antenna (selects at least one spatial direction associated with an antenna, see fig. 24) for data transmission based on the communication quality of said antenna (col. 26, lines 49-52; col. 27, lines 45-55); and concurrently transmitting data via the plurality of antennas across the plurality of sub-channels (col. 27, lines 64-67). Raleigh does not explicitly disclose each sub-channel selecting a plurality of antennas and providing power to each antenna of the plurality of antennas based on the number of data transmissions since the communication quality was last determined. Yun in a similar field of endeavor discloses plurality of antennas

coupled to a switch to select antenna signal selecting a plurality of antennas and providing power to each antenna of the plurality of antennas based on the number of data transmissions since the communication quality was last determined (page 4, section 0028, 0029). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to select antenna signal selecting a plurality of antennas and providing power to each antenna of the plurality of antennas as taught by Yun in the system of Raleigh because it can adaptively reduce signal distortion and fading effects due to multi-path in transmission of broadcast signals.

Regarding claims 26, 16, Raleigh discloses a method for a multiple-antenna device communicating with a single antenna device comprising:

for each of a plurality of antennas, determining communication quality of each sub-channel of a communication pathway, the communication pathway comprising a plurality of sub-channels (a "sub-channel" is a combination of a bin in a substantially orthogonalizing procedure (SOP)) (col. 1, lines 31-59; col. 2, lines 1-15);

for each sub-channel, selecting an antenna chain (array) from at least one antenna (selects at least one spatial direction associated with an antenna, see fig. 24) for data transmission based on the communication quality of said antenna (col. 26, lines 49-52; col. 27, lines 45-55); and

concurrently transmitting data via the plurality of antennas across the plurality of sub-channels (col. 27, lines 64-67). Raleigh does not explicitly disclose each sub-channel selecting a plurality of antennas and providing power to each antenna of the plurality of antennas based on the amount of time elapsed since the communication quality was

last determined. Yun in a similar field of endeavor discloses plurality of antennas coupled to a switch to select antenna signal selecting a plurality of antennas and providing power to each antenna of the plurality of antennas based on the amount of time elapsed (col. 3, lines 30-40) since the communication quality was last determined (page 4, section 0028, 0029). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to select antenna signal selecting a plurality of antennas and providing power to each antenna of the plurality of antennas as taught by Yun in the system of Raleigh because it can adaptively reduce signal distortion and fading effects due to multi-path in transmission of broadcast signals.

Regarding claim 9, Raleigh discloses, a method for a multiple antenna device communicating with a single antenna device comprising:

receiving data, transmitted from the single antenna device (a first wireless device) to a second wireless device, using a plurality of antennas, wherein each antenna communicates with the single antenna device (first wireless device) via an associated communication pathway (col. 2, lines 1-15);

determining a plurality of channel characteristics (within Channel ID block 130, the characteristics of the digital communication channel are estimated, the estimated channel values consist of entries in a matrix for each SOP bin, the matrix contains complex values representing the magnitude of the spatial channel within the SOP bin from one transmit antenna element to one receive antenna element, the transmitted information among the various sub-channels available for transmission are determined based upon the measured communication quality of the space frequency information

that carries the symbol stream) associated with each of the plurality of antennas (col. 8, lines 1-9; col. 5, lines 61-67; col. 6, lines 1-5);

replicating a single antenna transmit signal in order to permit the second wireless device to communicate with the single-antenna enabled wireless device (identical copies of transmitting signals are transmitted employing diversity such as in MIMO communication using multiple transmit and receive antennas and therefore is implicitly implied);

on a per sub-channel basis, computing an antenna chain (array) weighting vector for each antenna for each sub-channel based on the channel characteristics (channel state information within each SOP bin) (col. 2, lines 1-15; col. 6, lines 42-67; col. 8, lines 40-58);

representing the antenna weighting vector using a plurality of bits, (the input data sequence is encoded into sequence of symbols of digitized values or bits) each bit corresponding to a different sub-channel, and each bit indicating whether an antenna associated with the weighting vector is used to transmit data on the corresponding sub-channel (Note: the Industry Standard, such as IEEE 802.11a, b, g describes protocols for use in OFDM and in DSSS wherein communication between two devices is enabled by splitting into several parts or sub channels each byte of data to be transmitted for transmission concurrently or simultaneously on different frequencies over sub-channels of a wide frequency spectrum, is well known in the art of communication) (col. 2, lines 1-15; col. 5, lines 35-67; col. 6, lines 42-67; col. 8, lines 40-58);

for each communication pathway, combining a transmission signal with the weighting vector to form a weighted transmission signal (col. 6, lines 42-40; col. 8, lines 40-48); and

transmitting the weighted transmission signal from the second wireless device to the first wireless (from one device to another) device via a plurality of communication pathways (col. 6, lines 42-50; col. 7, lines 35-39). Raleigh does not explicitly disclose on a per sub-channel basis, computing a weighting vector for each antenna of the plurality of antennas. However, Yun discloses on a per sub-channel basis, computing a weighting vector for each antenna of the plurality of antennas (page 3, section 0027, lines 15-27; page 4, lines 1-2, section 0028, lines 14-29, section 0029, lines 4-8, 63, section 0030). It would have been obvious to a person of ordinary skill in the art to use weighting vector specify transmission power for each sub-channel for an associated antenna as taught by Yun in the art of Raleigh because it can minimize the total radiated power while maintaining acceptable quality levels for all channels (characteristics).

Regarding claim 10, Raleigh discloses data transmission from one wireless device to a plurality of devices and receives data from a plurality of wireless devices (col. 2, lines 1-8).

As per claim 11, Raleigh discloses each weighting vector specifies a relative transmission power for each sub-channel (col. 8, lines 63-67).

5. Claim 8, is rejected under 35 U.S.C. 103 (a) as being unpatentable over Raleigh et al (USP 6,144,711) in view of Yun (US Pub. 2007/0173277) and further in view of Kim et al (USP 7,366,247).

Regarding claim 8, Raleigh and Yun disclose all limitations of the claim above. The combination does not explicitly disclose a signal selection circuit (splitter) coupled to diversity logic to reproduce signals to be transmitted. However, Kim, discloses signal selection circuit (splitter) coupled to diversity logic to reproduce signals to be transmitted (col. 11, lines 9-30). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use selection circuit (splitter) coupled to diversity logic as taught by Kim in the system combined system of Raleigh and Yun because it can allow signals to be reproduced for transmission more effectively.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US Patent:

USP 6,037,898 to Parish et al.

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Qutbuddin Ghulamali whose telephone number is (571)-272-3014. The examiner can normally be reached on Monday-Friday, 7:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

QG.
August 11, 2009.

/Chieh M Fan/
Supervisory Patent Examiner, Art Unit 2611